





# INCIDENT INVESTIGATION REPORT

Type of occurrence <b>Drowning</b>			
Notice of incident number <b>2017112850005</b>	Incident outcome <b>Fatalities (1)</b>	Date of incident <b>January 30, 2017</b>	
Location of incident <b>Tolko sawmill 820 Guy Street Kelowna, B.C.</b>	Primary investigator <b>Martin NICHOLLS</b>	Investigation file number <b>FSI-REG-2017-0012</b>	
Approved by manager, Fatal and Serious Injury Investigations <b>Jeff YOUNG</b>	Signature 	Date <b>Feb. 28, 2019</b>	
<b>PARTIES INVOLVED IN INCIDENT</b>			
Employer	Name <b>Tolko Industries Ltd (Kelowna Division)</b>	Employer ID <b>753610</b>	Industry classification <b>714022 Sawmill</b>
Worker	s. 22 	<b>Deceased</b>	Occupation <b>Boom boat operator</b>

## Persons mentioned in report

Name	Known in the report as	Role in the incident/investigation
s. 22	Operator 1	Operated the boom boat. Drowned inside the boat when it sank.
s. 22	Operator 2	Operated the boom boat on the shift prior to the incident. Was not on site at the time of the incident.
s. 22	Barker Operator 1	Operated the large barker (bark removal machine) near the mill pond. Witnessed the boom boat in the water from the control booth.
s. 22	Barker Operator 2	Operated the small barker from the control booth with Barker Operator 1. Saw the submerged lights of the boom boat in the water.
s. 22	Loader Operator	Operated the loader, moving logs positioned by Operator 1. Saw the submerged lights of the boom boat in the water.
s. 22	Shift Supervisor	Organized a search for Operator 1 after receiving a report of an incident involving the boom boat.

## Scope

This incident investigation report sets out WorkSafeBC's findings with respect to the cause of and contributing factors leading to the workplace incident that occurred on January 30, 2017, at the log storage pond at the Tolko sawmill in Kelowna, British Columbia. The purpose of this report is to help employers and workers understand the factors that contributed to the incident so that similar incidents can be prevented in the future.

This investigation report may include some of the enforcement action taken under the *Workers Compensation Act* and the Occupational Health and Safety Regulation in response to the incident and as a result of the investigation. Regulatory compliance activities may be summarized here but will be documented separately.

## How the investigation was conducted

WorkSafeBC's Fatal and Serious Injury Investigations section, part of the Investigations Services Department, conducts health and safety investigations using a systematic approach based on the scientific method. This process involves collecting information from various sources to understand the facts and circumstances of the incident and analyzing that information to identify the causal and contributing factors that led to the incident.

The field investigation generally includes the following:

- Securing and examining the incident site, including any equipment involved
- Taking notes and photographs
- Interviewing people with relevant information, such as employer representatives, supervisors, workers, and witnesses
- Collecting documents such as equipment operating manuals, written procedures, and training records
- Conducting tests of materials or equipment, if necessary

The analysis of the information usually includes the following:

- Determining a sequence of events
- Examining significant events for unsafe acts and conditions
- Exploring the contributing factors that made the unsafe act or condition possible
- Identifying health and safety deficiencies

# Contents

<b>Incident synopsis</b> .....	<b>5</b>
<b>1 Incident details</b> .....	<b>5</b>
1.1 Tolko Industries Ltd.....	5
1.2 Workers.....	5
1.3 Work process .....	6
1.4 Sequence of events.....	8
1.4.1 Pre-incident events.....	9
1.4.2 Incident .....	9
<b>2 Findings</b> .....	<b>10</b>
2.1 Boom boat.....	10
2.1.1 Construction details .....	10
2.1.2 Post-incident examination.....	11
2.1.3 Cause of sinking.....	13
2.1.4 Boat inspection checklist .....	14
2.2 Operator 1's physical condition.....	15
2.3 s. 22 .....	15
2.4 Supervision .....	17
2.5 Working alone or in isolation policy .....	17
2.6 Personal flotation device.....	18
2.7 Working alone or in isolation with a risk of drowning.....	19
<b>3 Conclusions</b> .....	<b>20</b>
3.1 Cause.....	20
3.1.1 Improperly closed hatch caused boat to become swamped and sink.....	20
3.2 Contributing factors .....	20
3.2.1 Failure to implement drug and alcohol policy in a timely fashion — failure to adequately supervise the worker.....	20
3.2.2 s. 22 .....	20
3.2.3 s. 22 .....	20
3.2.4 Improper and non-functional personal flotation device.....	20
3.2.5 Failure to identify hazards when working alone or in isolation.....	21
<b>4 Health and safety actions</b> .....	<b>21</b>
4.1 WorkSafeBC .....	21
4.2 Tolko Industries Ltd (Kelowna Division).....	21

## Incident synopsis

At a sawmill, a worker was operating a boom boat (tugboat) in a log storage pond when the boat sank approximately 150 feet from the shore in 10 feet of water. The worker was unable to escape from the submerged boat. The worker drowned.

## 1 Incident details

### 1.1 Tolko Industries Ltd

Tolko Industries Ltd (Tolko) is a wood products manufacturer that operates eight sawmills, three plywood/veneer facilities, four whole log chippers, and three oriented strand board mills throughout British Columbia, Alberta, and Saskatchewan.

This incident occurred in the log storage and sorting pond (also referred to as the mill pond) adjacent to the Tolko sawmill in Kelowna, B.C., where a boom boat (a small, powerful, purpose-built tugboat) was used to move raw logs floating in the storage area. At the time of the incident, the Kelowna division of Tolko employed 196 full-time hourly workers, 20 casual workers, and 22 management and support workers.

### 1.2 Workers

Operator 1 (the deceased worker in this incident) began his employment with Tolko on s. 22 . He began operating the boom boat on s. 22 . As a boom boat operator, he was responsible for moving bundles of wood and logs into position to be lifted onto dry land for processing, operating the boat safely, refuelling periodically, and pumping out the bilge (area inside the boat where water collects). Operator 1 also had remote controls in the wheelhouse (cabin) of the boom boat to operate the bundle lift, a steam-operated machine used to lift bundles of logs from the water onto the land. s. 22

Operator 1 was assigned to work the afternoon shift from 15:30 to 24:00 hours on the date of the incident. He had worked overtime s. 22 the day before. s. 22

Operator 2 had been working at this facility for approximately s. 22 and had operated the boom boat for about s. 22 . He was operating the boom boat on the day shift, just prior to Operator 1 coming on to work the afternoon shift.

Barker Operator 1 was hired at this facility on s. 22 s. 22 .

s. 22 . Barker Operator 1 operates the large barker from a control booth with a view of the log storage pond.

Barker Operator 2 was first employed by Tolko at the sawmill on s. 22 , and had operated the small barker for about s. 22 prior to the incident. Barker Operator 2 sits beside Barker Operator 1 in the control booth with a clear view of the booming area.

The Loader Operator was hired on s. 22 . He had been operating a large loader capable of handling a load of bundled logs for about s. 22 prior to the incident. The Loader Operator has also operated the boom boat involved in this incident.

The Shift Supervisor has been employed at the sawmill since s. 22 . He supervised Operator 1 for about s. 22 .

### 1.3 Work process

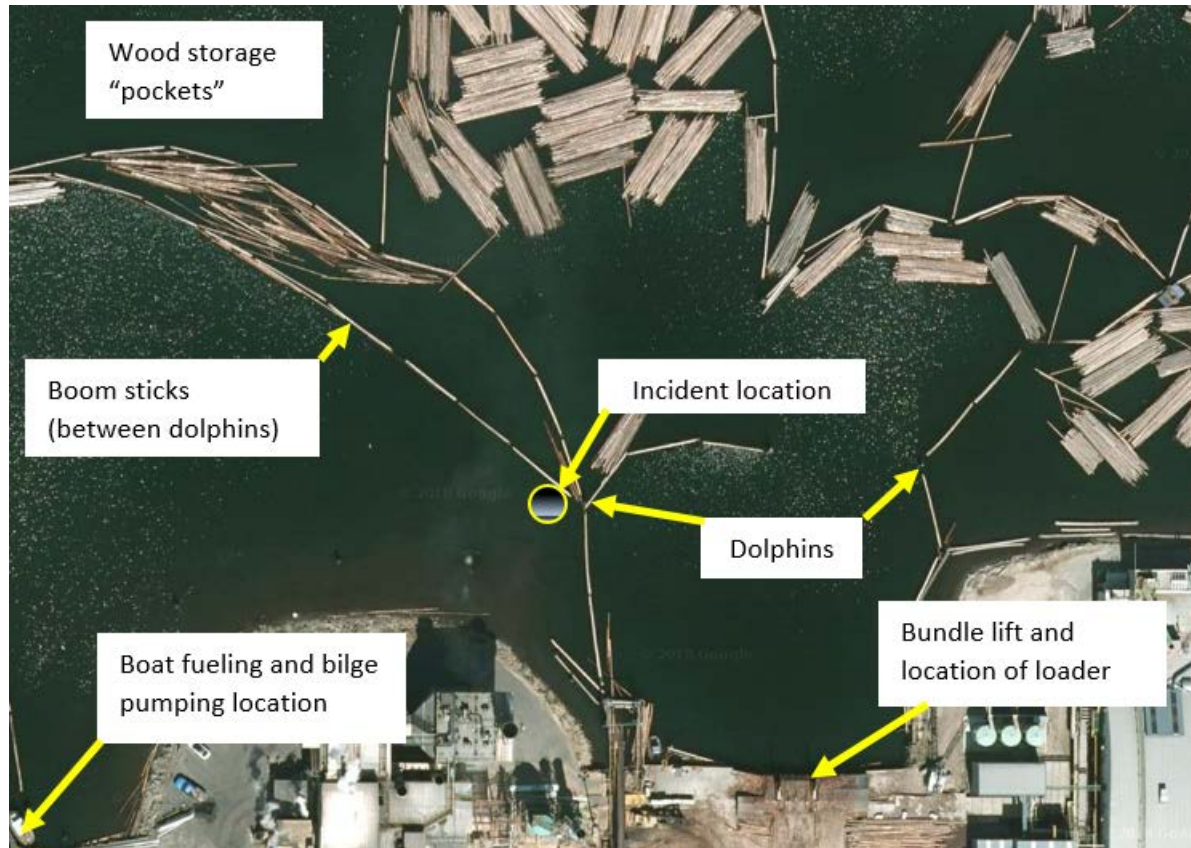
The boom boat operator, the loader operator, and the barker operators coordinate their activities to handle raw logs at the beginning of the sawmilling process. The boom boat (see Figure 1) is used to push bundles of logs around in the booming grounds.



**Figure 1:** The boom boat, showing the wheelhouse and the forward engine hatch cover fully open. (For more information, see section 2.1 of this report.)

The booming grounds is an area in the pond made up of dolphins (logs driven into the lake bottom) and boom sticks (floating logs chained together to form pockets and attached to the dolphins to contain the floating bundles of logs). (See Figure 2.) Logs are sorted into different pockets according to species, size, and other characteristics.

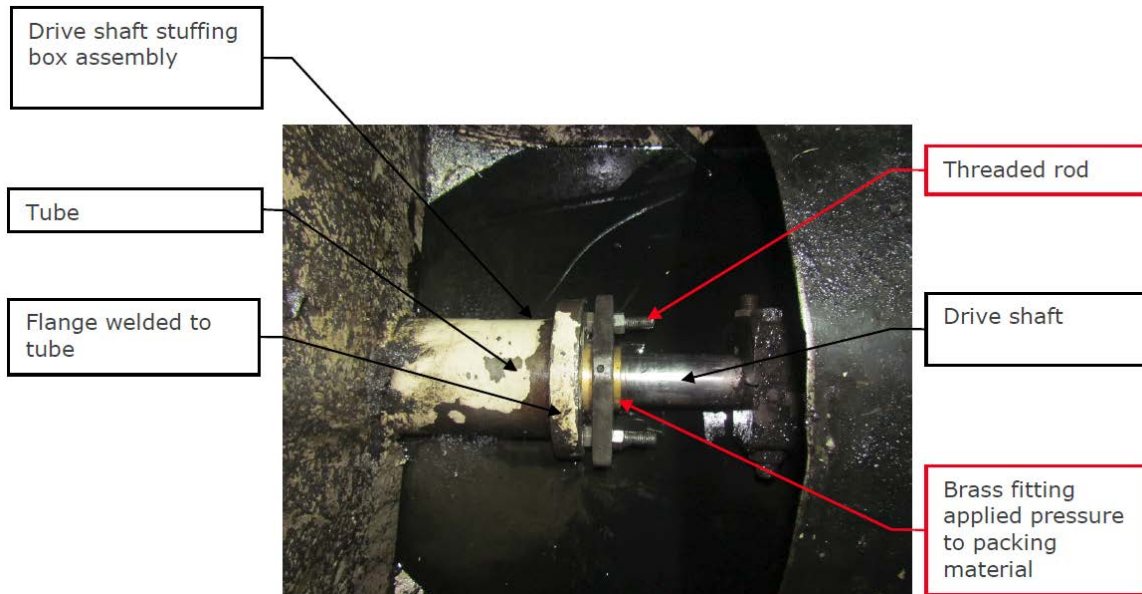




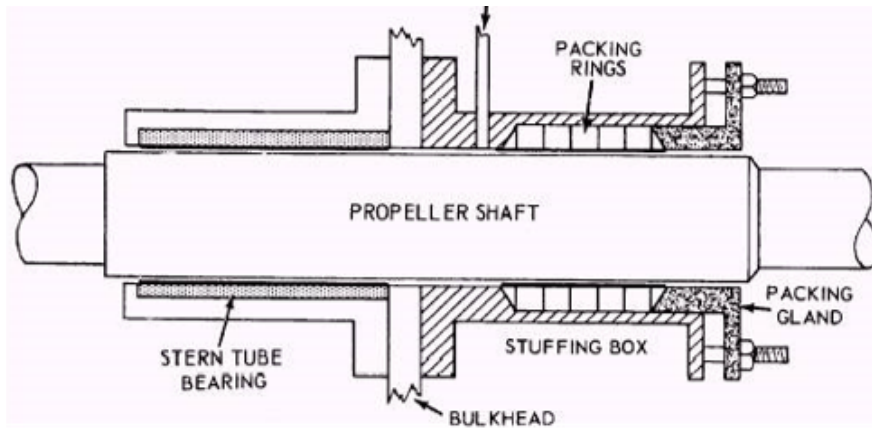
**Figure 2:** Aerial view of the sawmill and foreshore area. (Source: Google Maps. Imagery © 2018 City of Kelowna, DigitalGlobe, District of West Kelowna, Province of British Columbia, RDCA. Map data © 2018 Google.)

The boom boat operator sorts the bundles and moves bundles toward the bundle lift using the boom boat to push the logs. The bundle of logs is then positioned over the arms of the bundle lift, a steam-powered machine that lifts bundles of logs into or out of the water. The Wagner, a large loader capable of handling a full logging truckload of bundled logs, is then used to pass wood to the barker operators. The barker operators conduct the first step in the milling process, which is removing the bark from the logs.

Proper operating procedures require the boom boat operator to fuel the boat and, while docked, pump out the bilge water from the bottom of the boat into approved containers on shore. A stuffing box surrounding the propeller drive shaft (which passes through the hull) contains an ablative packing material that provides a seal between the drive shaft and the hull to keep water out. In normal operation, a small amount of water trickles from the stuffing box into the boat. The stuffing box requires regular inspection and periodic adjustment with a wrench if too much water is seeping into the boat because the packing material wears away and must be further compressed to maintain an effective seal. (See Figures 3 and 4.) This adjustment puts pressure on the packing, which slowly wears away during use. When the nuts are tightened to the bottom of their range of travel, the stuffing box must be serviced and new packing rings installed.



**Figure 3:** Stuffing box on the boom boat, showing nuts fully tightened to the bottom of their range of travel. The red boxes indicate the parts adjusted by the boom boat operators.



**Figure 4:** Diagram of a similar stuffing box, showing the adjustable packing gland that requires periodic tightening on the boom boat using the adjustment nuts. (Source: Integrated Publishing website, [tpub.com/engine1/en1-85](http://tpub.com/engine1/en1-85))

A personal flotation device (PFD) was left with the boat for each operator to wear when shift changes occurred.

## 1.4 Sequence of events

The weather on January 30, 2017, at 15:00 hours, was 1° Celsius with occasional clouds, dropping to -4° with a clear sky at 21:00 hours. There was no wind. There was no snow on the ground and docks surrounding the log storage pond. The pond would have been calm with no waves at the time of the incident.



#### **1.4.1 Pre-incident events**

The boat operator operating the boom boat on the early morning shift (which began at 22:30 hours on January 29) completed an operator inspection checklist that reported no problems with the boom boat. The boat operator completed a log book entry reporting that the level of bilge water and fuel was good at 05:00 hours on January 30, the day of the incident.

Operator 2 completed an operator inspection checklist for the boom boat at the start of his shift at approximately 08:00 hours on the day of the incident and made no comments about the condition of the boat. During his shift, he adjusted the stuffing box and recalled that it was close to the end of its normal adjustment range, indicating that installation of new stuffing would soon be required.

Operator 1, the Loader Operator, Barker Operator 1, and Barker Operator 2 came on shift at 15:00 hours on the day of the incident. The Loader Operator met with Operator 2 at 15:00 hours and learned that the mill was processing white wood (spruce, pine, fir, and balsam) that day.

Operator 1 worked in the mill pond operating the boom boat and completed an operator inspection checklist sometime after arriving for his shift. On the checklist, he indicated that the boom boat passed the inspection and noted: “Packing is bottomed out.” Where the checklist asked, “Has anything changed since you last operated this equipment? ie: damage, leak,” Operator 1 noted: “Packing all loose — loss.” The precise meaning of this comment is unclear, but it does refer to a change in the packing since Operator 1 had last operated the boom boat.

#### **1.4.2 Incident**

The sinking and resulting fatality was not witnessed. The investigation determined that the following occurred:

At approximately 18:30 hours, the Loader Operator communicated his need for balsam wood for processing to Operator 1. Operator 1 moved wood to the bundle lift and continued to supply wood to the Loader Operator. The Loader Operator could see the boom boat as it moved around the pond.

At approximately 20:00 hours, Operator 1 radioed the Loader Operator and said that he was going to the dock to pump out the bilge of the boat. No written record exists to indicate whether the bilge was pumped out. The Loader Operator went for lunch at 20:30 hours and returned to work at 21:00 hours.

At 21:02 hours, the Loader Operator saw the boom boat operating on the water near a location referred to as the “pine pocket.” (See Figure 2 for an image of pockets of wood in the pond.) The Loader Operator believed that Operator 1 was in the process of getting a wood bundle to place on the bundle lift. The Loader Operator left the waterfront area to go to a dryland log storage area in another part of the mill property to get a bundle of logs.

It is presumed that the boom boat sank between 21:02 and 21:09 hours. The Loader Operator was gone for approximately seven minutes and then returned to the waterfront near the bundle lift at approximately 21:09 hours. The Loader Operator waited about two more minutes, expecting to see the boom boat deliver a bundle of wood to the bundle lift, but did not see the boom boat operating anywhere within view.

Barker Operator 1 and Barker Operator 2 were in the control booth and had a view of the booming grounds. At 21:15 hours, Barker Operator 1 looked out the window and saw lights projecting up from under the water. Barker Operator 1 attempted to radio Operator 1 but did not get a response. Barker Operator 1 alerted the Loader Operator and asked him to look for the boom boat. Barker Operator 1 alerted Barker Operator 2, who also saw lights under the water and thought it was the boom boat lights. Barker Operator 2 called the Shift Supervisor to report they thought the boom boat had sunk. The Loader Operator also saw the boom boat lights projecting from under the water from his vantage point.

The Shift Supervisor arrived a few minutes later and, together with the Loader Operator, launched another boat to investigate. They approached the boom boat, which was about 4 inches underwater, s. 22 . The Shift Supervisor ordered a mill shutdown and organized a search of the foreshore area and of the floating log bundles in the log storage pond in an attempt to locate Operator 1.

A search and rescue team arrived at the pond and at approximately 02:00 hours determined that there was a body in the wheelhouse of the sunken boom boat. The RCMP Marine Investigation Team attended later that morning and recovered the body of Operator 1 from inside the sunken boat.

## 2 Findings

### 2.1 Boom boat

#### 2.1.1 Construction details

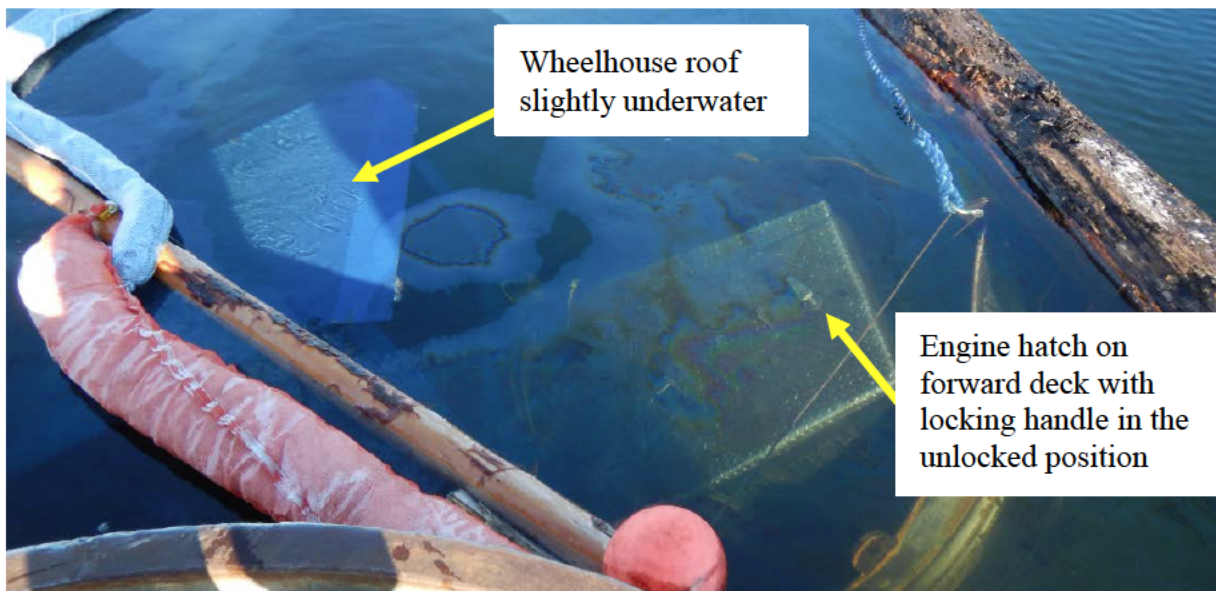
The boom boat involved in this incident is a small tugboat named the *Mowitch*. (See Figure 1.) The boat was built in 1973 in Vancouver by Westcoast Salvage & Contracting Co. Ltd. Constructed of steel with a gross registered tonnage (a measure of internal volume, not to be confused with the mass or weight of the boat) of 2.59, the boom boat is 15 feet long, 7.9 feet wide, and 4.4 feet deep. The boom boat received a significant refit during the winter of 2012–2013, which included replacing the wheelhouse and rebuilding the engine.

The drive shaft passes through the hull at the rear of the boat to turn the propeller. The stuffing box contains packing material that provides a seal between the rotating shaft and the water outside the hull, as described above in section 1.3.

The front deck of the boom boat has an engine hatch cover to allow access to the engine for servicing. The hatch has a handle on it that rotates to lock the hatch shut.

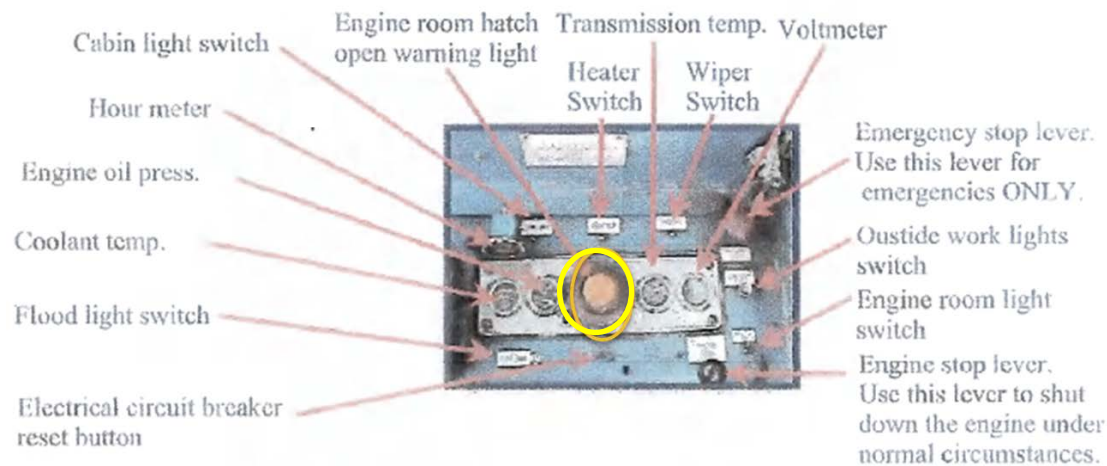
### 2.1.2 Post-incident examination

The boom boat sank in approximately 10 feet of water about 150 feet from the nearest shore, close to a dolphin. The wheelhouse was only a few inches under the surface of the water. The door on the left side (port side) of the boat was open and in a latched position against the rear bulkhead of the wheelhouse. The engine cover on the front deck of the boat was in place, but the locking latch for the hatch was in the open position. In other words, the engine cover was not locked (see Figure 5).



**Figure 5:** The boom boat resting on the bottom of the pond, just slightly under the surface of the water. The engine hatch cover latch (locking handle) is in the open (unlocked) position.

The training manual for the boat includes a labelled photograph that depicts a warning light to warn if the front hatch was not locked. (See Figure 6.) Examination of the boom boat revealed that the dashboard and controls on the boom boat were significantly different from the image in the training manual. No warning light for the engine hatch cover was noted on the existing dashboard. The boom boat was rebuilt in 2012 and received a new wheelhouse and dashboard at that time. The designer of the boat as it was originally configured may have considered an unlatched hatch to be a hazard to operation of the boat; hence, the warning light on the control panel.



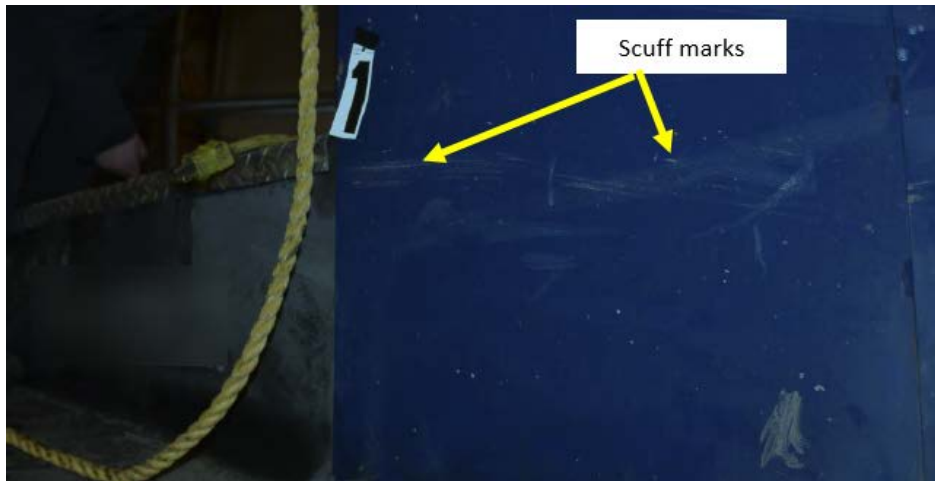
**Figure 6:** Image from the safety competency training manual for the boom boat, showing the boom boat controls, including a large red warning light labelled “Engine room hatch open warning light.” (Source: Tolko Industries Ltd)

Operator 1 was wearing a PFD that required the wearer to pull a cord to inflate the PFD. The PFD was not inflated.

The boom boat was refloated and removed from the water for examination. The throttle was found to be in a full forward position (in other words, full power in a forward direction). The rudder of the boat was turned all the way to the left, indicating the last steering input may have been hard to the left. However, the boat settled to the bottom at a sharp downward angle, resulting in the weight of the boat resting on the rudder, so it is possible that the rudder position was affected by the weight of the boat.

The boom boat appeared to have collided with logs, but it is not known if the collision occurred before or after the boat sank. Wood splinters were wedged into the door jamb of the right wheelhouse door, which was in a closed position. It was not possible to determine whether the splinters were the result of a collision before the sinking or if the wood deposit resulted from contact with a floating log after the sinking.

The wheelhouse of the boom boat was painted blue. Close examination of photographs taken by the RCMP Marine Investigation Team revealed blue paint transfer to a bundle of logs stored in the pond. Scuff marks with wood fibres adhered to them were observed on the left side of the wheelhouse and in the RCMP investigator’s opinion may have been the source of the paint transfer to the logs. (See Figure 7.) It is possible that the scuff marks resulted from contact with this bundle of logs. These scuff marks were at the same height as the front hatch on the boom boat, which may explain how the unfastened hatch came to be open, allowing water to enter and sink the boat.



*Figure 7: Scuff marks that are the possible source of paint transfer to a bundle of logs observed after the incident. (Source: RCMP)*

In addition, the exhaust stack attached to the rear of the wheelhouse was bent. Wood fibres were found on the stack, which suggests that the damage occurred after the incident as a result of log bundles drifting over the boat and striking the exhaust stack.

A partially full bottle of alcohol was found in a backpack recovered from inside the wheelhouse. The contents of the bottle were tested and found to be slightly lower than the 40% alcohol content specified on the label of the bottle.

### **2.1.3 Cause of sinking**

As mentioned above, when the boat was recovered, the engine hatch was not locked closed.

The Loader Operator has operated the boom boat in the past and reported that the boom boat has a tendency to plow its nose underwater if operated at full throttle.

The Loader Operator said that the boom boat could become swamped and sink if the bilge was not pumped out at least once per shift. Operator 2 told investigators that failing to pump out the bilge in a timely manner would result in the boat sinking lower in the water, to the point where water would wash over the front deck of the boat. Boat operators are trained to check the stuffing box seal for excessive leakage every time they pump out the bilge. Operator 2 noticed on the day shift that the stuffing box would need more packing added soon. Operator 1 also noted on the boat inspection sheet he completed that the stuffing box adjustment was at the bottom of its range of adjustment.

The stuffing box was inspected and found to be allowing a small amount of water to enter the boat. The amount of leakage was not significant and was considered normal. If Operator 1 did in fact pump out the bilge prior to the incident, the leakage at the stuffing box is not considered a factor in the sinking.



The investigation failed to determine exactly what caused the boom boat to sink, but there are two possible theories:

- As the result of striking an object (such as a bundle of logs), the front of the boat was driven underwater.
- The boat was manoeuvring or pushing a bundle of logs, which somehow impacted the boat, causing the front of the boat to be driven underwater.

With the front of the boat underwater, water was able to enter through the unsecured engine hatch, resulting in the boat becoming swamped and sinking.

### 2.1.4 Boat inspection checklist

Section 1.4.1 above describes the checklist and inspection protocol used by the boat operators on the day of the incident. Figure 8 shows a copy of the checklist prepared by Operator 1, presumably when his shift commenced on the day of the incident. There is no specific reference to ensuring the front hatch is locked. None of the checkboxes were checked off by Operator 1. Only a brief note describing the condition of the packing material in the stuffing box was recorded on the inspection checklist.

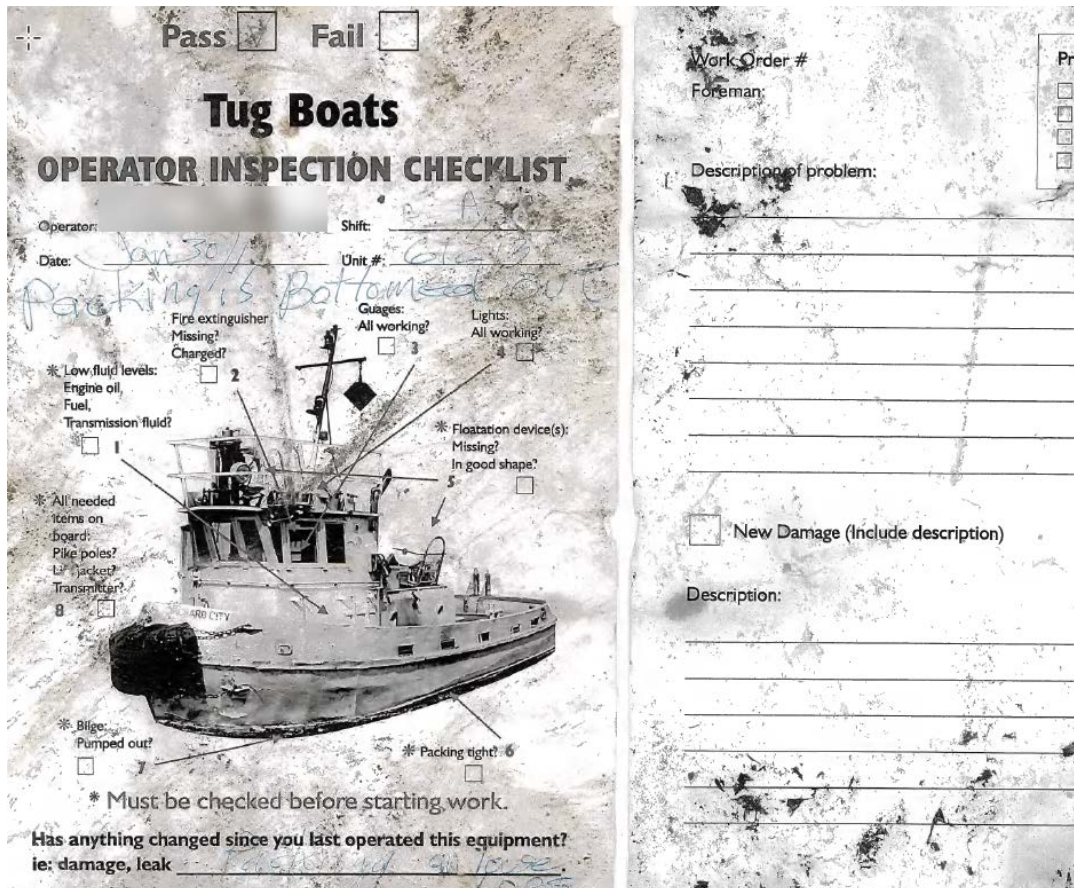


Figure 8: Operator inspection checklist filled out by Operator 1 on the day of the incident.

## 2.2 Operator 1's physical condition

s. 22



The coroner conducted a physical examination of the wheelhouse of the boom boat. No evidence indicative of s. 22 was found inside the wheelhouse after the boat was recovered.

## 2.3

s. 22



s. 22



s. 22



s. 22



s. 22



s. 22

[REDACTED]

s. 22

[REDACTED] Management ought to have implemented meaningful supervision strategies and progressive discipline in accordance with Tolko's policies which could have included testing.

Unilateral actions taken by Tolko after the incident appears to be in response to a deficit in either policy or implementation of policy detected during Tolko's investigation of the incident. Actions taken by Tolko to improve safety are detailed in section 4.2 of this report. These actions include a requirement for all workers to check in with a supervisor for assessment at the start of shift and a company-wide training program to assist supervisors in the detection of substance abuse in the workplace.

## 2.4 Supervision

Prior to the incident, Tolko did not have a firm policy regarding assessment of the sobriety of workers at the start of a shift. s. 22

[REDACTED]

[REDACTED] As mentioned above in section 2.3 and detailed below in section 4.2, Tolko has taken steps to address this issue.

Operator 1 had a position that allowed him to begin his shift and immediately isolate himself from supervisors by being away from shore on the water.

## 2.5 Working alone or in isolation policy

4.20.1 of the Occupational Health and Safety Regulation states that "to work alone or in isolation" means to work in circumstances where assistance would not be readily available to the worker

- (a) in case of an emergency, or
- (b) in case the worker is injured or in ill health.

4.20.2 of the Regulation states:

- (1) Before a worker is assigned to work alone or in isolation, the employer must identify any hazards to that worker.
- (2) Before a worker starts a work assignment with a hazard identified under subsection (1), the employer must take measures
  - (a) to eliminate the hazard, and
  - (b) if it is not practicable to eliminate the hazard, to minimize the risk from the hazard.

After the incident, WorkSafeBC requested Tolko's working alone procedures for boom boat operators. WorkSafeBC received the following response from Tolko:

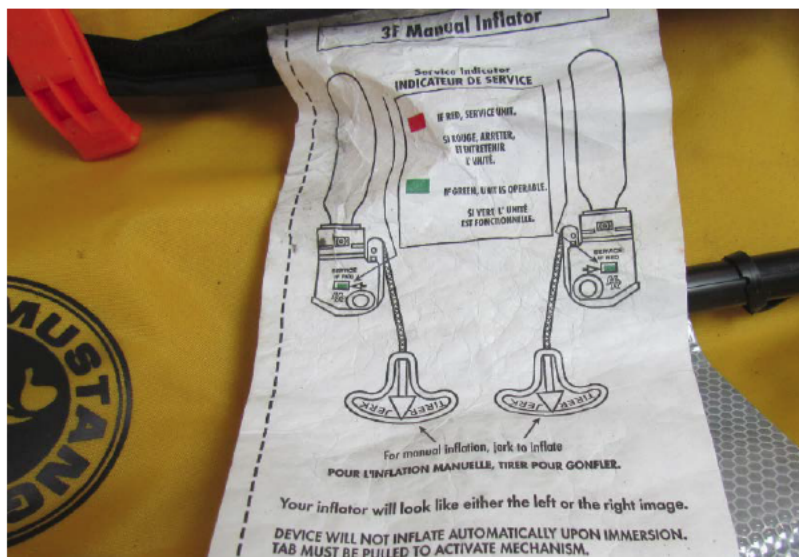
The Employer does not consider boom boat operators to be working alone and therefore, does not have working procedures for boom boat operators. The boom boat operator and the Wagner [loader] operator work together as a team and are in regular communication. The Wagner operator also conducts regular visual checks of the boom boat operator.

Since Tolko failed to identify that the boom boat operation met the definition of working alone or in isolation as defined in the Regulation, Tolko did not prepare and implement policy related to working alone or in isolation. Nor did Tolko take measures to eliminate the hazard or minimize the risk associated with the hazard.

In this incident, Operator 1 was in regular radio contact with other workers but, due to isolation, was in a position where assistance was not readily available to him if he became injured or ill.

## 2.6 Personal flotation device

The PFD worn by Operator 1 was a manually operated Mustang Survival PFD, model MD3052. It is designed to be manually inflated by the wearer, who would inflate the PFD by pulling on a cord, which causes compressed gas to be released into flotation chambers in the vest. (See Figure 9.)



**Figure 9:** Close-up of a tag found inside the PFD, showing how the handle hangs out the bottom of the PFD and is jerked to inflate the buoyancy aid.

The Underwriters Laboratory standard UL 1191-2013, *Standard for Components for Personal Flotation Devices*, specifies that the force required to activate the PFD should be less than 15 foot-pounds. Expert testing of the PFD worn by Operator 1 revealed that the PFD did not activate even though up to 30 foot-pounds of force was exerted on the pull cord. The arming



mechanism was inspected, and it was discovered that the pull cord was improperly routed so that no amount of force would result in deployment. The PFD appeared to have either been re-armed or manufactured improperly and was non-functional. This could have been due to improper repacking by users of the PFD or a design and manufacturing issue.

Section 8.28 of the Occupational Health and Safety Regulation states that if a worker working alone is exposed to a risk of drowning, the worker must wear a flotation device meeting the requirements of section 8.27(a), (c), or (d):

- Section 8.27(a) references Canadian General Standards Board (CGSB) Standard CAN/CGSB-65.7-M88 for inherently buoyant lifejackets with a minimum buoyancy of 21 pounds.
- Section 8.27(c) references CGSB Standard 65-GP-14M for inherently buoyant lifejackets with a minimum buoyancy of 28 pounds.
- Section 8.27(d) references British Safety Standard BS EN 396-1994 for automatically inflatable units with a minimum buoyancy of 34 pounds.

The PFD worn by Operator 1 was neither inherently buoyant nor automatically inflatable and therefore did not meet the requirements of any subsections of section 8.27 of the Regulation. The PFD worn by Operator 1 and by other persons operating the boom boat did not comply with the Regulation.

## **2.7 Working alone or in isolation with a risk of drowning**

Operator 1 was working in isolation with a risk of drowning. As described in section 2.6 of this report, the lack of a functioning PFD worn by Operator 1 is in violation of section 8.28 of the Regulation and is a contributing factor in this incident.

Guideline G8.28, “Working alone or in isolation with a hazard of drowning,” states that section 8.28 of the Regulation applies to a worker who is not within eyesight or earshot of another worker in a position to immediately come to the worker’s aid should the worker enter the water. Operator 1 was within eyesight and earshot of other workers; however, the other workers were not in a position to immediately assist Operator 1 should he enter the water. *Canadian Oxford Dictionary* states that *immediately* means “instantly, without pause or delay” or “with no object, distance, time, etc. intervening.”

In this instance, in order to effect a rescue, other workers would have had to call a supervisor with access to keys for a rescue boat, locate a qualified operator, and travel a significant distance at slow speed. Tolko lacked the necessary procedures to immediately come to Operator 1’s aid.

## 3 Conclusions

### 3.1 Cause

#### 3.1.1 Improperly closed hatch caused boat to become swamped and sink

The exact circumstances surrounding the sinking of this boat are unknown because the incident was not witnessed. However, given the information that is available and the nature of this work, it is logical to conclude that the boat was swamped by water that rapidly filled the engine compartment, causing the boat to sink quickly. The boom boat's engine hatch was not closed properly. It was supposed to be secured by turning a handle that was found in the open position after the incident. This open hatch would allow large volumes of water into the engine compartment of the boat if it was swamped. Given the nature of this work, swamping could occur if the front of the boat was driven underwater as a result of a collision with an object (such as a bundle of logs) or from pushing a bundle of logs.

### 3.2 Contributing factors

#### 3.2.1 Failure to implement drug and alcohol policy in a timely fashion — failure to adequately supervise the worker

s. 22

[REDACTED] The employer had an alcohol-testing regimen but did not implement it. s. 22

#### 3.2.2 s. 22

s. 22

#### 3.2.3 s. 22

s. 22

#### 3.2.4 Improper and non-functional personal flotation device

The PFD worn by Operator 1 was not appropriate for the task at hand because it was neither inherently buoyant nor automatically inflatable. The Occupational Health and Safety Regulation

requires a worker who is working alone or in isolation and exposed to the risk of drowning to wear an inherently buoyant or automatically inflatable buoyancy device.

In addition, the PFD was inspected after the incident and found to be non-functional. The pull cord that activates the inflation mechanism was improperly routed, rendering the PFD inoperative. This could have been due to improper repacking by users of the PFD or a design and manufacturing issue.

### **3.2.5 Failure to identify hazards when working alone or in isolation**

Operator 1 was in regular radio communication with other workers throughout the workday. In addition, at least three workers were in positions to observe Operator 1 while he was operating the boat. However, Operator 1 was physically isolated from other workers or rescue personnel able to readily provide assistance because Operator 1 was alone in a boat far from shore. Operator 1 was working in isolation with a risk of drowning, and the employer took no measures to eliminate or reduce the hazard by ensuring that an effective rescue operation was immediately deployable and Operator 1 was wearing an inherently buoyant or automatically inflatable PFD. This incident was not witnessed; therefore, the radio communications and observation by other workers were proven to be ineffective measures to protect Operator 1.

## **4 Health and safety actions**

### **4.1 WorkSafeBC**

WorkSafeBC generated notice of incident 2017112850005, detailing the facts collected immediately after the incident.

During the investigation, WorkSafeBC identified two violations of the *Workers Compensation Act* and the Occupational Health and Safety Regulation by Tolko Industries Ltd. These violations are described in detail in inspection report 201817962009A:

- Section 115(1)(a)(i) of the Act — Failure to ensure the health and safety of workers
- Section 8.28 of the Regulation — Failure to ensure a worker working alone and exposed to the risk of drowning wore a lifejacket meeting specified requirements

### **4.2 Tolko Industries Ltd (Kelowna Division)**

Tolko took actions after this incident to improve worker safety as follows:

- Inspected all PFDs at the workplace and replaced all manually operated PFDs with PFDs that automatically inflate.
- All workers are required to report to the control room staff at the start of their shift.
- Shift supervisors are to have personal contact with boat operators at least once per shift.

- Shift supervisors are to have regular radio contact with boat operators during regular operations.
- A person-overboard system has been installed on every boat to alert others if a worker falls into the water.
- Every boat operator is required to test and wear the person-overboard sending unit as personal protective equipment before operating any water vessel.
- Adjustments to improve lighting were made in the log storage pond.
- Operators and supervisors have completed an in-house cold-water immersion awareness course.
- Safe work procedures for the boom boat operator, towboat operator, and towboat deckhand were updated to include more detailed pre-use inspection criteria as well as a detailed person-overboard testing and rescue procedure.
- During winter months, use of a cold-water survival suit is required as personal protective equipment.
- A new watertight seal was installed on the engine hatch of the boom boat.
- The engine hatch on the boom boat has been modified so it must be locked down before the boat can be operated.
- All tugboats have had their bilge pumping systems modified to automatically pump into the pond if internal bilge water levels get too high.
- A forensic alcohol and drug expert who specializes in the detection of alcohol and drug usage in the workplace was contracted and has completed 12 workshops, 2 of which were at the Kelowna sawmill.